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The influence of repeated cold water immersion on adaptations to strength and power training.

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Introduction

Cold Water Immersion (CWI) is a popular recovery strategy utilised by athletes in order to attenuate the negative influence of strenuous exercise on subsequent performance. One of the proposed physiological mechanisms underpinning the use of CWI is the potential to limit the inflammatory response after acute exercise. Given that the inflammatory cascade ultimately leads to muscle regeneration and repair, it is pertinent to investigate the longer term impact of regular cryotherapy exposure on adaptations to strength and power training.

Methods

Thirteen resistance trained males (mean age 25.8 ± 5.5 years; height 1.8 ± 0.1 m; mass 83.6 ± 15.7 kg; 4RM back squat 146.2 ± 38.5 kg) completed an 8 week (1 x 4 week strength and 1 x 4 week power block) lower body resistance training program. Participants were match-paired into either the CWI (10 min at $10^\circ \pm 0.5^\circ$) or placebo group based on a ratio of lean mass to 4RM back squat. Participants completed 2 training sessions per week and completed their allocated recovery intervention after each training session. Measures of muscle fibre pennation angle, maximal voluntary isometric contraction (MVIC) at 90° , peak torque of the knee extensors (60deg·s), and isometric squat parameters (peak force and rate of force development (RFD)) were measured at baseline, midpoint and post training intervention. Results were analysed using magnitude based inferences.

Results

At the post testing session, CWI demonstrated a likely moderate harmful effect on muscle fibre pennation angle compared to the placebo group (CWI: 11.4; $\pm 4.8\%$; placebo: 21.5; $\pm 8.4\%$). However, CWI demonstrated a likely large beneficial effect on peak torque (60deg·s) compared to the placebo group (CWI: 7.5; $\pm 6.5\%$; placebo: -2.4; $\pm 4.0\%$) at midpoint. There were trivial differences between groups for isometric peak force and peak torque (60deg·s) from baseline to post. All other effects were unclear.

Discussion

The greater increase in muscle fibre pennation angle in the placebo group compared to the CWI group would indicate a greater increase lean muscle mass. However, CWI still demonstrated a positive impact on peak torque at 60 deg·s compared to the placebo group. Blood sample analyses are ongoing and may offer further insight into the underpinning mechanisms. Further investigation is warranted to better understand the potential negative impact of repeated cryotherapy exposure on functional adaptations to strength and power training stimuli.